The Sidereal Messenger.

CONDUCTED BY WM. W. PAYNE,

Director of Carleton College Observatory.

DECEMBER 1885.

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By faith we understand that the worlds have been framed by the word of God, so that which is seen hath not been made out of things which do appear.

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XUM

The Sidereal Messenger

CONDUCTED BY WM. W. PAYNE,

Director of Carleton College Observatory, Northfield, Minnesota.

"In the present small treatise I set forth some matters of interest to all observers of natural phenomena to look at and consider."—GALILEO, *Sidereus Nuncius*, 1610.

VOL. 4. NO. 10. DECEMBER, 1885. WHOLE NO. 40.

THE GREAT RED SPOT ON JUPITER.

PROF. G. W. HOUGH, DIRECTOR OF DEARBORN OBSERVATORY.

The earlier observers of the planet *Jupiter* inferred that its visible surface was subject to rapid and extraordinary changes, occurring in a few days, or even a few hours.

"On the 13th of December, 1690, Cassini perceived five belts on the planet, two in the northern hemisphere, and three in the southern. An hour afterward there appeared only the two belts nearest the center, and a feeble trace of the remaining northern belt. The same astronomer frequently witnessed the formation of new belts on the planet in the course of one or two hours."—*Grant's History of Physical Astronomy.*

Without multiplying examples of alleged extraordinary changes, it may be added that the tradition has come down to us that there is no permanency with regard to the markings on the disc, and this doctrine appears to have been adopted by modern observers. I entirely dissent from this view of the subject.

I think it is more rational to believe that such extraordinary phenomena as the formation or destruction of belts, in an hour or two, was due to the condition of the seeing, rather than to physical change on the surface of the planet.

Soon after the discovery of the great red spot on the southern hemisphere of the planet Jupiter, in 1878, it was alleged, by various astronomers, that it was subject to marked fluctuations in its length. Similar statements have been made from time to time during the past seven years.

The following micrometer measurements, from Sept. 11th 1879, to June 27th, 1885, of the length, breadth and latitude of this object, may help us to decide whether such statements were warranted.

The micrometer observations for length usually consisted of five single distances, the time being noted. The measures, preferably, were made when the center of the spot was near the central meridian of the planet, but occasionally they could only be secured at 25 or 30 degrees distance.

The measures for breadth were made in the same manner.

The latitude, or distance from the equator, was determined by three measures from each pole.

In the table, the first column is the date; second, the length; third, the difference in length from the "mean" of all the observations; fourth, breadth; fifth, latitude.

Date.	Length.	Dif. Mean.	Breadth.	Latitude.
1879.	"	"	"	"
Sept. 11	11.12	—0.54	3.26	.....
Sept. 18	.....	.....	.....	—7.12
Sept. 25	10.82	—0.84	.....	—6.44
Oct. 5	13.27	+1.61	2.38	—7.56
Oct. 10	11.80	+0.14	3.05	—7.11
Oct. 14	13.03	+1.37	3.61	.....
Oct. 15	13.21	+1.55	.....	—7.00
Oct. 20	12.24	+0.58	.....	—7.14
Oct. 22	.....	.....	3.52	.....
Oct. 29	11.90	+0.24	3.57	—7.25
1880.				
Feb. 10	12.78	+1.12	.....	—6.00
June 9	10.67	—0.99	.....	.....
June 16	12.53	+1.87	3.79	—6.79
July 3	11.30	—0.36	.....	—7.01
July 5	11.28	—0.38	3.72	—6.95
July 8	11.66	—0.00	3.28	.....

Date.	Length.	Dif. Mean.	Breadth.	Latitude.
1880.	"	"	"	"
July 20	12.10	+0.44	.....	.....
July 22	11.38	−0.28	.....	−7.09
July 27	11.94	+0.28	3.32	.....
July 29	.....	.....	.....	−7.50
Aug. 3	11.37	−0.29	.....	.....
Aug. 5	11.98	+0.32	3.41	.....
Aug. 6	.....	.....	.....	−7.42
Aug. 11	.....	.....	.....	−7.46
Sept. 4	10.90	−0.76	3.41	−7.32
Sept. 6	11.95	+0.29	.....	.....
Sept. 9	12.03	+0.37	3.87	−6.81
Sept. 21	11.47	−0.19	.....	.....
Oct. 13	11.55	−0.11	3.39	−7.04
Nov. 26	10.73	−0.93	3.63	−7.00
Dec. 10	10.94	−0.72	.....	.....
Dec. 12	11.51	−0.15	.....	.....
1881.				
Jan. 17	12.28	+0.62	3.65	−7.23
June 20	.....	.....	.....	−7.44
June 22	11.93	+0.27	.....	.....
July 28	11.51	−0.15	.....	−7.28
Aug. 2	11.64	−0.02	.....	.....
Aug. 4	.....	.....	.....	−7.23
Aug. 24	11.36	−0.30	3.54	.....
Sept. 21	11.05	−0.61	.....	.....
Oct. 7	.....	.....	.....	−7.50
Oct. 24	.....	.....	.....	−8.15
Oct. 26	11.34	−0.32	3.41	−6.95
Nov. 21	11.50	−0.16	3.52	.....
Nov. 22	11.57	−0.09	.....	−7.33
Dec. 28	10.56	−1.10	.....	.....
1882.				
Jan. 9	10.65	−1.01	.....	−7.27
Feb. 4	11.04	−0.62	4.17	−7.26
Feb. 14	11.45	−0.21	.....	.....
Mar. 22	11.25	−0.41	.....	−7.57
July 13	11.90	+0.24	.....	.....
July 25	.....	.....	.....	−8.09
Aug. 18	.....	.....	.....	−7.69
Sept. 25	11.93	+0.27	3.66	.....
Oct. 3	11.76	+0.10	.....	.....
Nov. 1	11.20	−0.46	.....	.....
Dec. 29	11.03	−0.63	3.64	−7.34
Dec. 31	12.16	+0.50	.....	−7.58
1883.				
Jan. 3	12.54	+0.88	.....	.....
Feb. 20	11.79	+0.13	.....	−7.33
Feb. 27	11.32	−0.34	.....	−7.17
Mar. 9	12.04	+0.38	.....	.....
Mar. 21	12.34	+0.68	.....	−7.25
Mar. 23	11.95	+0.29	.....	.....

Date.	Length.	Dif. Mean.	Breadth.	Latitude.
1883.	″	″	″	″
Apr. 9	.....	.....	.....	−7.70
Sept. 10	.....	.....	.....	−6.37
Sept. 17	13.09	+1.43	.....	−6.99
Nov. 6	12.23	+0.57	.....	−5.67
Nov. 24	11.79	+0.13	.....	−6.81
1884.				
Feb. 9	.....	.....	.....	−5.79
Feb. 22	11.90	+0.24	.....	−6.33
Mar. 9	12.84	+1.18	.....	.....
Apr. 2	11.93	+0.27	.....	.....
Apr. 4	.....	.....	.....	−6.71
Apr. 16	.....	.....	.....	−6.31
Apr. 26	.....	.....	.....	−5.82
May 13	.....	.....	.....	−6.14
Nov. 7	11.61	−0.05	.....	−6.60
1885.				
Feb. 2	.....	.....	.....	−6.73
Feb. 27	10.32	−1.34	.....	−6.69
Mar. 9	.....	.....	.....	−6.41
Mar. 11	9.83	−1.83	4.60	.....
Mar. 23	10.02	−1.64	4.00	−6.20
Apr. 4	10.92	−0.74	4.01	.....
Apr. 9	.....	.....	.....	−6.78
May 3	11.17	−0.51	.....	.....
May 10	11.10	−0.56	4.59	.....
May 15	12.73	+1.07	.....	−6.11
June 8	.....	.....	.....	−6.63
June 27	12.77	+1.11	.....	−6.09
Mean.	11.66	68 obs.	3.61 26 obs.	−6.96 57 obs.

The mean length from 68 observations is 11″.66 or 37°.9 of Jovian longitude. (Mr. Denning, in the *Observatory* for October, has inadvertently given 34°.3 as equal to 11″.65.)

The mean breadth from 26 observations was 3″.61, and the mean distance from the equator of the center of the spot, from 57 observations, was −6″.96.

Assuming that the length of the spot remained constant, the mean error of a single measure was + 0″.59 or 2 degrees.

The observations made during the opposition of 1880, when the conditions for measurement were most favorable, gave a mean error of +0″.43. These errors are not excessive.

An examination of the residuals in the third column leads us to infer that the fluctuations, if any, in the length of the

great red spot, between Sept. 1879 and June 1885, were inappreciable to the eye of the observer.

The apparent length, as measured, was undoubtedly affected by the conditions of the seeing. Under very favorable conditions of the atmosphere the ends of the spot appeared as a sharp V, but when the definition was not so good, they were blunt and rounded. A difference of one second of arc, on either end, due to this cause, would not be an improbable quantity.

During the period covered by these measures, there was probably a slight oscillation in the length, as shown by the residuals in the third column.

The following synopsis will show at a glance the possible fluctuation in length, breadth and latitude.

The numbers show the deviation during each opposition from the general "mean."

Opposition.	Length.	Breadth.	Latitude.
	″	″	″
1879	+0.59	+0.15	—0.01
1880	—0.11	—0.07	—0.18
1881-2	—0.36	+0.05	—0.44
1882-3	+0.17	+0.04	—0.56
1883-4	+0.63	.....	+0.61
1884-5	—0.50	+0.69	+0.46

The breadth appears to have been pretty constant until 1884, when it was apparently 0″.7 greater than the mean. The latitude also varied slightly from year to year.

The eye estimates of the length of the spot, from the observed transit of the two ends over the central meridian of the planet, are subject to personal error, as well as large accidental error. However carefully the observations may be made, only an approximate result can be secured by this method.

In the *Observatory* for October Mr. Denning has compiled the mean values observed in 1879-82 for a number of observers. The deduced length varies between 29°.3 and 37°.8, or more than twenty per cent.

I think it will be found that small telescopes and insufficient magnifying power make the spot too short, since the extreme end will not be seen.

The red spot was observed for longitude on the 23d and 25th of October, and from its appearance then I judge it will be a conspicuous object during the coming opposition.

THE HABITABILITY OF OTHER WORLDS.

H. A. HOWE.

[For the Messenger.]

It is difficult to treat in a small space of a subject on which so much has been written, unless, indeed, one is confined to a mere statement of known facts. Unfortunately, the amount of theorizing in the present case is entirely disproportionate to the amount of knowledge, and it is not always easy to separate the known from the unknown, so thoroughly are they interwoven by the writers.

As the ancients peopled even the trees of the forest with spirits, and the Arabians made the enchanted air teem with *genii*, so it has been a wide-spread opinion of men in all ages, that the shining spheres about us shelter beings whose intellectual life is in some degree akin to our own. When at the dead of night, while nature is hushed in repose, one looks out upon the over-arching sky, inlaid with "patines of bright gold," and, perchance, plying his telescope, is carried in imagination from cluster to cluster, from universe to universe, the thought that there is no intelligent being in those unfathomable depths of space, gives an oppressive sense of the loneliness of man. Can it be that the eyes and reason of man alone are feasted by this transcendent spectacle, and that even he is chained by an inexorable law to a bit of rock which we call *Earth*, and forever kept from a full view of these glories? Has the all-wise Creator fashioned them in vain? Recoiling from such thoughts, men have given loose reign to imagination, and made the glowing orbs about us instinct with intelligence.

They have even sought to clothe these intelligences with human forms, and no less a personage than the elder HERSCHEL once thought that there might be a heavy layer of clouds beneath the glowing exterior of our *Sun*, to protect the inhabitants within from its heat. All analogies lead to the belief that the stars in the heavens are attended by troops of planets, as our *Sun* is. If one choose to think that these planets are the abode of sentient beings, or even that the race of mankind is scattered over the universe, and that some day myriads of them, freed from the bondage of their present bodily form, may be gathered home on some star-cluster of inconceivable grandeur, we may call the theory extravagant, but not impossible. If it be asserted that the shining stars are peopled by orders of intelligent beings, whose organisms are suited to their environment, the possibility that the assertion is true cannot be denied. But if, on the other hand, we are told that the inhabitants of *Earth* are so magnificent in their mental and spiritual endowments that, when they escape from their present chrysalis forms, the entire visible universe will be none too vast or wonderful for the exercise of their powers, we may be disposed to side with this view of the matter.

Special interest is felt in the planets of our own system, and many think that some of them are inhabited by man. Accepting both the Nebular Hypothesis, and that part of the Theory of Evolution which concerns the adaptability of species to a slowly changing environment, it is easy to conclude that each of the planets either may have been in the past the abode of the man-like creatures, or may be in the future. Let us, however, restrict our inquiry to the following plain question: Are the present physical conditions of the planets compatible with the existence of man on them?

Mercury is subject to great variations of heat on account of the eccentricity of its orbit. At its perihelion the solar rays beat ten times as fiercely upon it as upon us, while at aphelion the ratio is reduced to 4.6. Such heat would prove fatal to mankind, were there no protecting atmosphere. ZOLLNER, by photometric methods, has come to the conclusion that *Mercury* has no ap-

preciable atmosphere, but to VOGEL's eye the spectroscope gives some evidence of an absorptive envelope. The waters of the seas (if there are any), rapidly raised by the *Sun*, would become condensed at no great height, because of the rarity of the atmosphere, and being precipitated again, might furnish a continual rain-storm, which would mitigate the heat. But, on account of the low barometric pressure (the intensity of gravity being less than half that on the surface of the *Earth*), the planet would be uninhabitable for us.

Venus receives heat of twice the intensity of ours, but it is positively known that its atmosphere is quite dense. The aureole of light seen at the times of transit demonstrates its refractive power, and VOGEL has found that the same rays of light are absorbed by it as by our own atmosphere. Though human eyes have probably never pierced the cloud-mantle which envelopes the planet, the seeming quiescence of that envelope shows that there is no great amount of internal heat; we therefore think that there is a solid crust. TACCHINI has detected aqueous vapor in the cloud-mantle, and our present knowledge indicates that the conditions of life on *Venus* are not very dissimilar to what they would be here, if we were robbed of our sunny skies, and accustomed to perpetual rain and snow. The inclination of its axis to the plane of its orbit being unknown, nothing can be predicted with reference to its seasons.

The telescopic appearance of *Mars* has led to a general belief that it is quite like the *Earth*, and maps have been constructed, showing supposed continents and seas. The phenomena of the polar ice-caps, which are said to increase and decrease as the seasons change, and the occasional cloud-like objects which are sometimes thought to obscure the outlines of the promontories, all lend color to the hypothesis that the processes of evaporation and condensation of water go on there as here. But *Mars* has a much sunnier sky than ours, and there is abundant evidence that its atmosphere is quite tenuous. Thus the solar rays, though reaching the planetary surface easily, are not stored up in it, but are radiated away rapidly, so that the temperatures of day and night differ widely. The height of

the barometric column is estimated by WINCHELL to be in the neighborhood of four inches. Men who would enjoy respiration up in a balloon, ten miles above the surface of the *Earth*, may be recommended to try their lungs on *Mars*.

Our telescopes show that *Jupiter* is in a state of ferment, and there is evidence that a solid crust has not been formed. It is a huge, seething caldron; the heated vapors rising from the interior, being cooled on reaching the outer surface, descend again, and keep up a ceaseless round of motion. *Jupiter* may well be surrendered to salamanders, if Shakespeare's opinion about those animals is correct.

The visible surface of *Saturn* is much more placid than that of its giant neighbor, and HUGGINS'S spectroscope has shown that the planet's nucleus is buried deep in an atmospheric ocean. No crust is supposed to exist, but if it has been formed, there may be sufficient *internal* heat, (as indicated by the presence of aqueous vapor in the atmospheric envelope), to keep mushroom-like men alive for awhile, cultivating the warm, muddy soil, and breathing the muggy air.

Uranus and Neptune, at their enormous distances, cannot elude the spectroscope, which shows very dark bands in their spectra, caused by the absorption of dense atmospheres. The telescope reveals no changing aspect. The solar rays, wearied by the long journey, are entirely unable to send a thrill of life through these passive orbs, and we may readily believe that the blood of a warm human heart would be congealed in a moment in their frigid depths. But if one prefer to think that they have solid crusts warmed by internal heat, no astronomical observations can be cited against the theory. Such homes must be dark, clammy prisons into whose depths no distinct cheering ray of starlight, moonlight or sunlight ever penetrates.

The *Moon* and the asteroids have no atmospheres sufficient to sustain human life.

If all other conditions were favorable it would be impossible for man to exist on any planet, unless the composition of its atmosphere was closely allied to that of our own.

On the whole, it may be said that there is but slight probability that men dwell upon any planet of our system except the *Earth*. Prof. ALEXANDER WINCHELL affirms as the result of his researches, which are based on the Nebular Hypothesis, that "within the vast limits of the solar system, there is but one happy niche where corporeal organizations according to our standard can enter into material relations with the physical environment."

UNIVERSITY OF DENVER, Colorado.

NEBULA OF ANDROMEDA.

BY JOHN H. EADIE.

[For the Messenger.]

Allow me to draw attention to the following quotation from Professor SIMON NEWCOMB'S "Popular Astronomy," fifth edition, in regard to the great nebula in *Andromeda*:

"It was first described by Marius, in 1614, who compared its light to that of a candle shining through horn. This gives a very good idea of the singular impression it produces, which is that of an object not self-luminous, but translucent, and illuminated by a very brilliant light behind it. With a small telescope, it is easy to imagine it to be solid, like horn; but with a large one, the effect is much more that of a great mass of matter, like fog or mist, which scatters and reflects the light of a brilliant body in its midst. That this impression can be correct, it would be hazardous to assert; but the result of a spectrum analysis of the light of the nebula certainly seems to favor it. Unlike most of the nebulæ, its spectrum is a continuous one, similar to the ordinary spectra from heated bodies, thus indicating that the light emanates, not from a glowing gas, but from matter in a solid or liquid state. This would suggest the idea that the object is really an immense star-cluster, so distant that the most powerful telescopes cannot resolve it. Though we cannot positively deny the possibility of this,

yet in the most powerful telescopes the light fades away so softly and gradually that no such thing as a resolution into stars seems possible. Indeed, it looks less resolvable and more like a gas in the largest telescopes than in those of moderate size. If it is really a gas, and if the spectrum is continuous throughout the whole extent of the nebula, it would indicate either that it shone by reflected light, or that the gas was subjected to a great pressure, almost to its outer limit, which hardly seems possible. But, granting that the light is reflected, we cannot say whether it originates in a single bright star or in a number of small ones scattered about through the nebula."

In view of the recent blazing out of a star apparently at or near the center of this nebula, his remarks are certainly very suggestive. Particularly so when it is remembered that the spectrum of *Messier 80*, in *Scorpio*, is also continuous, and its nature therefore similar, in the midst of which a new star suddenly shone out in May, 1859.

RECENT SHOWERS OF METEORS.

BY W. F. DENNING.

[For the Messenger.]

During the four months from July to October, 1885, I observed about 670 meteors, during observations extending in the aggregate over 70 hours. The paths of all such meteors as were noted accurately, were registered, and their peculiarities of appearance recorded, for the purpose of determining their radiant points. In all, about 55 distinct radiant points were found, and I have selected some of the most noteworthy of these in the following table. They represent the most active meteor streams seen here during the period mentioned, and I believe the positions may be relied on, every possible care having been taken to assure accuracy:—

Epoch of shower.	Night of Max.	Radiant Point. RA.	Dec.	No. of Meteors.	Appearance.
1885.		°	°		
July 8 -13.....	8th	245	+52	7	Meteors very slow.
July 9 -14.....	13th	271	+21	8	Slow, faint.
July 9 -14.....	12th	329	+36	8	Swift, streaks.
July 9 -13.....	9th	280	−14	7	Slow, long paths.
Aug. 16-20.....	17th	345	± 0	7	Medium speed.
Aug. 8 -20.....	17th	345	+53	10	Very swift.
Aug. 16-20.....	20th	5	+12	7	Medium speed.
Sept. 1 -8	4th	346	± 0	9	Slow, bright.
Sept. 1 -15.....	3rd	354	+38	19	Very swift.
Sept. 3 -5	3rd	253	+54	7	Slow, yellow.
Sept. 3 -17.....	8th	62	+36	16	Very swift, streaks.
Sept. 4 - 9.....	9th	335	+71	7	Medium speed.
Sept. 5 -17.....	15th	76	+57	7	Very swift, streaks.
Sept. 8 -18.....	8th	335	+28	8	Slow, faint.
Sept. 12-17.....	15th	5	+12	8	Slow.
Sept. 15.....	15th	13	+ 6	7	Swift.
Oct. 6 -12.....	12th	103	+33	8	Very swift, streaks.
Oct. 6 -16.....	8th	42	+55	13	Slow.
Oct. 6 -16.....	16th	143	+49	6	Swift, streaks.
Oct. 7 -8	7th	31	+18	10	Slow, bright.

In addition to these there were a considerable number of minor showers, whose radiants I regard as established with nearly equal certainty. It seemed desirable, however, at present, not to extend the list beyond the more marked displays.

Possibly Mr. O. C. Wendell might undertake to compute the orbits of some of these recently determined showers, or Mr. E. F. Sawyer (well known for his accurate meteoric work in the years 1877 to 1880) may redetect them during future observations.

A comprehensive catalogue of all the meteor streams hitherto observed has long been felt as a great want by those engaged in this department of astronomy. When a radiant point of a new comet has been computed, or a fresh meteor shower observed, it becomes necessary to search through more than a dozen different catalogues of radiants for comparisons. This entails much labor, and, moreover, there are very few persons who possess all the results hitherto published. In order to facilitate reference and to obviate the difficulties mentioned, I have just completed a general catalogue of all the known meteor showers, and arranged the radiant points according to Right

Ascension, instead of according to epoch, as in pre-existing catalogues. I believe the method adopted will be found thoroughly efficient when practically tested, and it is my aim to get the catalogue published as quickly as possible, so that observers may have it in their hands early next year. It contains some 2,500 radiant points, and will include observations to the end of 1885.

BRISTOL, October 25, 1885.

VARIATION IN THE NEBULA OF ANDROMEDA.

BY W. H. NUMSEN.

[*Concluded from page 280.*]

Sept. 16th:—7*h* 35*m* to 8*h* 25*m*. Very clear and beautiful during the whole time, moonlight—p. 25. Definition very bad. Nucleus plainly visible, except at times blurred and diffuse, but at such times the stars indistinct also. Comparisons made between intervals when definition moderately sharp. Fully equal to *b* and *c*, sometimes think slightly brighter. Certainly brighter than *d*, and much brighter than *e*. Plainly not as bright as *a*, *f* also brighter. About equal to *g*, that star probably very slightly brighter. 9th.

Sept. 17th:—9*h* 15*m* to 9*h* 55*m*. Very clear and beautiful again, moonlight, stars sharp to naked eye—p. 25. Definition simply execrable again. Nucleus not always visible, most of the time blurred; compared at intervals of moderate definition. Appears just about equal to *b* and *c*, certainly not as bright as *f*, and *h* also brighter. Certainly brighter than *d* and *e*. Much brighter than *x*, undecided about *g*, as definition so bad most of the time. Stars *x* and *y* both plainly visible with p. 25. 9th.

Sept. 18th:—8*h* 35*m* to 9*h* 40*m*. Clear and beautiful, bright *Moon*—p. 25. Definition poor again, although at times the stellar nature of the nucleus is plainly evident. Just about equal to *b* and *c*, sometimes think it very slightly brighter, and

again very slightly fainter. Still certainly brighter than *d*, and much brighter than *x* and *y*. Plainly much fainter than *f* and *h*, generally somewhat fainter than *g*, although at times when nucleus is steadily seen, there does not appear to be much difference in favor of that star. 9th.

Sept. 19th:—7*h* 10*m* to 7*h* 45*m*. Strong moonlight—p. 25. Nucleus very uncertain, owing to bad atmosphere; for considerable intervals not visible at all, at others pretty distinctly stellar. Magnitude difficult on this account. Some haze and cirrus occasionally. Think it somewhere between *b* or *c* and *d*,

Nova and Companion Stars.

certainly brighter than *e*, and think somewhat brighter than *d*. Generally appears when steadily visible about equal to *b* and *c*, although sometimes think it fainter, and once or twice very slightly brighter. Certainly much fainter than *h* and *f*. 9¼.

Sept. 22nd:—8*h* 30*m* to 9*h*. Passing clouds, fairly clear for only half an hour, then clouded up, with rain—p. 25. Not as bright as *b* and *c*, both always easier than nucleus. Still much brighter than *x* and *y*, not positive about seeing *x*, and *y* certainly invisible. Certainly brighter than *e*, if *e* is seen, and brighter than *d*, which is seen. *l* and *m* pretty sure are brighter, and *k* also, I think. Nucleus always plainer than *n*, which is not readily seen, and was not noticed for some time. 9¼.

Sept. 23d:—7*h* 45*m* to 8*h* 30*m*. Superbly clear, full *Moon*—

p. 25 and 60. Definition bad, not seen steadily, magnitude difficult. *b* and *c* always seen much easier, *k*, *l* and *m* also certainly brighter, *n* also is apparently somewhat brighter. Generally brighter than *e*, and perhaps about equal to *d*, though at times thought slightly brighter. Probable brightness somewhere between *d* and *e*. Certainly brighter than *x*, *y* and *o*. 9½.

Sept. 24th:—7*h* 10*m* to 7*h* 40*m*. Some haze, bright *Moon*, definition bad—p. 25. No material change since last night. Not equal to *b* and *c*, and certainly not equal to *l* and *m*; pretty sure *n* is also brighter. Certainly brighter than *e*, and generally equal to *d*, sometimes, perhaps, very slightly brighter. 9½.

Sept. 25th:—7*h* 40*m* to 8*h* 30*m*. Pretty clear, bright *Moon*—p. 25. Apparently about the same as last night, certainly no brighter. *b* and *c* easily brighter; uncertain at times about *d*, but generally about as bright as that star. Certainly brighter than *e*. Comparisons difficult, stars hard to see at times. 9½.

Sept. 26th:—7*h* 30*m* to 7*h* 50*m*. Pretty clear, some haze; *Moon* rising through haze—p. 25 and 60. A very perceptible difference since last seen. Only seen at short intervals, and then no comparison to *b* and *c*, *d* plainly much brighter. When visible the longest and steadiest, do not think it more than equal to *e*, certainly never any brighter. Does not seem much brighter, if any, than *x*, but brighter than *y* when best seen. Nucleus so small, difficult to separate it from bright condensation in the estimates. 10th.

Sept. 27th:—9*h* 30*m* to 9*h* 45*m*. *Moon* up, cirrus troublesome—p. 60. Seen only at intervals. When at its best and steadily seen, not equal to *d*, but brighter than *x*. Just about equal to *e*, much brighter than *y*. Impression formed is that it may be very slightly brighter than last night. (This may have been due, however, to its being seen at a higher altitude.) 9¾.

Sept. 28th:—9*h* 35*m* to 11*h* 5*m*. Light cirrus, *Moon* in haze and clouds. After 10*h* clear around the nebula, and p. 120 then used. Nucleus generally pretty distinct, only at times not seen. When seen steadily, certainly brighter than *y* and generally thought to be slightly brighter than *x*. Not as bright

as *d*, but appears just about equal to *e*. Much brighter than *z*. 10th.

Sept. 29th:—6*h* 55*m* to 7*h* 25*m*. Somewhat misty—p. 60. Certainly not as bright as *d*, not near as bright. Still plainly brighter than *y*. Generally think it slightly brighter than *x*, but not brighter, if any, than *e*. Probably between *e* and *x*. 10¼.

Sept. 30:—10*h* 55*m* to 11*h* 50*m*. Clear, *Moon* near last quarter—p. 60. Apparently no material change. Certainly brighter than *y*, and much brighter than *z*. Hardly think it as bright as *d*, but probably somewhere near *e*. 10¼.

Oct. 3d:—7*h* to 8*h*. Interrupted for considerable intervals by cirro-cumuli. Clear between clouds—p. 60. Seen generally pretty steadily, definition good. No more comparison with *d*; *e* also, I am sure, is easily brighter. Pretty sure *x* also slightly brighter. Probably just about equal to *y* and *z*, both those very nearly same magnitude. Much brighter than *w*. Somehow or other, have an impression that the condensation is not as bright as formerly. 10½.

Oct. 4th:—9*h* 45*m* to 10*h* 10*m*. Very clear and sharp—p. 60 and 120. About same as last night. Just about equal to *y* and *z*, though at times think nucleus somewhat brighter, size for size. Still much brighter than *w*. 10½.

Oct. 6th:—6*h* 55*m* to 7*h* 15*m*. Clear at first, stopped by clouds—p. 60. Think somewhat fainter than when last seen. *x* much brighter, *y* also certainly easier than nucleus. Think *z* may also be slightly brighter. Still much brighter than *w*. 10¾.

The above comparisons are the final results obtained from the series of observations made on the different nights. Numerous comparisons with the different stars were made on each night, and until a pretty satisfactory result was obtained. Comparisons became more difficult after the nucleus had sunk to the ninth magnitude and under, owing to the bright condensation in which it was situated.

Baltimore, Oct. 6, 1885.

COMPARISON STARS.

a	D. M. +39° 158 7.0	magnitude.	
b	D. M. +40° 145 9.0	"	
c	D. M. +40° 149 9.1	"	
d	D. M. +40° 143 9.5	"	
e	D. M. +40° 144 9.5	"	
f	D. M. +39° 167 7.1	"	
g	D. M. +39° 166 8.5	"	
h	D. M. +40° 158 7.5	"	
k	D. M. +40° 156 9.0	"	
l	D. M. +40° 154 9.0	"	
m	D. M. +40° 151 8.9	"	
n	D. M. +40° 146 8.8	magnitude.	
o	D. M. +40° 150 9.5	"	
x	Not in D. M., estimated magnitude slightly under 10th.		
y	Not in D. M., estimated magnitude about 10½ nearly.		
z	Not in D. M., estimated magnitude about 10¼.		
w	Not in D. M., estimated magnitude about 11 to 11½.		

McKIM OBSERVATORY.

W. V. BROWN.

(For the Messenger.)

The McKim Observatory was opened in September as a department of De Pauw University. It is located in the suburbs of the University town of Greencastle, Ind., in west longitude from Greenwich 86°37½′, north latitude 39°37′. The building and the full instrumental equipment which it is designed to have are the gift of Mr. ROBERT MCKIM, of Madison, Ind. This gentleman, who has so signally evinced his interest in astronomy, has for a number of years had a 6-inch glass, mounted in a handsome dome of his own manufacture near his residence, so that the observatory he has just presented to De Pauw University might almost be called the second McKim Observatory.

Dr. J. P. D. JOHN was given the directorship in addition to his duties as Professor of Mathematics, and the planning and construction of the building proceeded under his immediate supervision. For the very first step, Mr. MCKIM and Dr. JOHN visited nearly every prominent Observatory in this country, noting in each the features to be adopted or avoided; and this preliminary outlay of time and trouble has brought its reward in giving to the University an Observatory which is a model of beauty and convenience.

The University, at about this time, purchased a large

tract of land, which included a low hill, the highest ground, however, in a radius of several miles. Here the Observatory was located, six hundred feet from the nearest road, and half a mile from the nearest railroad track. It enjoys an unusual freedom from the dust and the jar of teams or trains.

The limestone formation, which prevails so largely over Indiana, at this point makes an unbroken bed rock only twelve feet below the surface; and, after much reflection, it was decided that the pier for the equatorial should not go down to the solid rock, but an elastic layer of clay of a thickness of four feet was left between the rock and the base of the pier. The efficiency of this clay in acting as a cushion was recently tested by carefully watching a sun-spot while workmen who were digging a cistern two hundred and fifty feet away exploded two blasts, and not the slightest tremor could be detected.

The dome and telescope are from WARNER & SWASEY, of Cleveland. The dome is seventeen feet in diameter, made wholly of iron, and is modeled after the dome of the McCormick Observatory, but with a few variations in detail. It also differs from the McCormick dome in being unlined.

The way in which WARNER & SWASEY triumphed over friction in the case of the great McCormick dome is well known, and their peculiar system of friction rollers has been described at the meeting of the American Association. It only remains for me to say that the McKim dome is to the observer a continual source of satisfaction and comfort. There is no gear-wheel, no crank, no windlass, no grinding at the dome or shutter until the muscular exertion has unfitted one for accurate work. A simple straight arm comes down along the wall, and a pull which would register twelve pounds on a spring balance will move the dome rapidly.

The shutter, although made in one piece, moves with a pull of only eight pounds, so that the wind is readily able to blow it open or to close it; and, when open, the impact of the wind against the shutter can revolve the dome.

The telescope has a Clark glass of 9.53 inches clear aperture,

and WARNER & SWASEY have fitted it up with many conveniences, such as a focusing handle on each side of the telescope tube; clamps and slow motion rods brought down to the eyepiece, and working independently in R. A. and Decl.; spoked wheels for moving the instrument in R. A. or Decl. and placed by the position circles; and a right ascension indicator.

The driving clock is also of a new design by WARNER & SWASEY. It is placed in a little apartment in the iron pier, and being enclosed by glass doors, is in itself an ornament.

I do not know but that its construction has already been described in these pages, so I will simply say that its performance does not leave anything to be desired. The regulation of it is simplicity itself, and a power of seven hundred diameters on the telescope fails to show any irregularity or lack of smoothness in running.

For observations in R. A., or declination, latitude, longitude, or for clock errors, it is decided to purchase an Almucantar, rather than a Meridian Circle. We are thoroughly convinced that the McKim Observatory will but head the long list of the observatories that in the future will regularly depend upon Almucantars for time and star places.

Our mean time clock is by the HOWARD Co., of Boston, and is already mounted, but the sidereal clock is yet to be obtained.

The aim throughout has been to put up an observatory which should at once be fitted for a working observatory, and also be adapted to the instruction of students in astronomy.

Thus far, the building and instruments have cost $8,000, and about $2,000 more are to be expended.

How well the two diverse purposes have been combined is for the future to disclose.

ERRATA.

Page 222, after July 16, for $9^h\ 15^m\ 28^s$ read $9^h\ 34^m\ 26^s$.
Under log. Δp, same line, for $8.292n$ read 8.063.
Page 248, last line but one, for *more* read *none*.

NOVA ANDROMEDÆ.

E. E. BARNARD.

[For the Messenger.]

The new star in the great nebula of *Andromeda* has been observed here on every favorable occasion with the 6-inch equatorial.

Comparisons of the light of the *Nova* with that of other stars in the field have been made at each observation, and some remarkable and rapid fluctuations in its light noticed. I must say, however, that I regard these quick changes with much suspicion, though it seems highly probable that the radiance of the star is subject to certain variations. Since the star has diminished to a small point its light seems to come and go every few minutes. I have at almost every observation lately been struck with this apparent ebb and flow of light. For a few seconds the star will almost totally disappear; strain your eyes as best you may, you cannot see it clearly; but presently it will become quite bright and distinct; remaining thus a short time, it will again fade away, even while other stars in the field are fairly steady. These changes are so rapid that I would far rather seek some other explanation of the phenomenon than to suppose it due to actual alterations in the star itself.

It will be well to notice that there is now comparatively little difference between the brightness of the nebula and the star; a very slight disturbance in the atmosphere—not enough to disturb the light of the neighboring stars—might be sufficient to blend together the light of the star and nebula, and thus cause an apparent fading of the stellar point.

I think this explanation of these rapid fluctuations all the more probable from my experience with certain of the nebulæ which have a small nucleus, or stellar center. There are several such nebulæ that I have encountered in my comet-seeking. As an example I would give G. C. No. 4514.

I have been struck, when looking at this nebula, with the wonderful changes that apparently go on in an ordinary night. There seems to be an almost constant battle going forward be-

tween the nebula and the bright stellar nucleus; for a moment the nucleus will be overcome, and its light blending with that of the nebulosity, it will seem to have faded out; but presently you will see it flash forth brightly and steadily and perfectly stellar in form; a few moments thus and it is gone again. Now, I never thought of attributing this to real changes in the star-like center.

The fluctuations of the light of the *Nova* are precisely similar to those in the nebula referred to. While the *Nova* was bright there was great contrast between it and the nebulous background, therefore slight disturbances in the air would not so sensibly affect the star; but bring the light of the star and the nebulosity to near an equality, and the equilibrium is easily destroyed by a feeble disturbance that might not sensibly affect another star in the same field. Of course, the only way to decide as to whether these changes are real or not, will be to have simultaneous observations made at stations remote from each other. If in such cases the observations invariably indicate change at the same absolute instant of time, why then the proof is clear; otherwise, I think we should be very careful in the interpretation of these apparently wonderful changes.

VANDERBILT UNIVERSITY, October 20th, 1885.

EDITORIAL NOTES.

This number completes the fourth volume of the MESSENGER, and with it a large number of subscriptions expire. Our friends are requested to inform us promptly whether or not its continuance is desired, so that mailing lists may be revised during the month of December.

Amateur observers are requested to watch the *Merope* nebula. November 10 it was plainly seen by one observer, but on the 13th following it was very faint.

The twenty-eighth volume of the Washington astronomical and meteorological observations, for the year 1881, has been distributed. We are aware of the causes that make it necessary to delay these publications three or four years before they can be printed, and so become of general use. It is not the fault of those in charge of the work at the Naval Observatory, but is chargeable to higher authority. It is a source of painful

regret that these things continue so year after year. There is no real need of it. If the scientific men of this nation shall unitedly say this irregularity shall continue so no longer, it will speedily end. Then why not say so?

Besides star and planet observations by the transit circle, those of the 26-inch equatorial on the satellites of *Saturn*, *Uranus* and *Neptune* are noticeably important. This volume also contains two carefully prepared papers by Professor HALL; one on the orbits of *Oberon* and *Titania*, the outer satellites of *Uranus*, and the other on the satellite of *Neptune*. The mass of each of the planets *Uranus and Neptune*, as determined by late studies of their satellites, has already been published in this journal. It is gratifying to notice the attention that these papers has received at the hands of foreign distinguished astronomers.

In 1884, Oct. 17, Professor LANGLEY read a paper before the National Academy of Sciences at Washington, "On the Temperature of the Surface of the *Moon*." The points made at that time were:—

1. Concerning the direct measurement of lunar heat as compared with solar. No ratio was then found. A presumption was raised by the observations "that the earth's atmosphere is diathermanous to heat of lower wave-length than has been heretofore supposed, and lower wave-length than appears to reach us from the *Sun*."
2. Comparison of *Moon's* heat with that of Leslie Cube. Inference from this class of observations was that the sunlit surface of the *Moon* is not far from the freezing temperature, but not so far below as might be expected of an absolutely airless planet.
3. Transmission of lunar heat by the *Earth's* atmosphere.
4. Comparative transmission of glass for lunar and solar heat.
5. Observations during a lunar eclipse.
6. Formation of a lunar heat spectrum.

Each of these methods showed abundance of heat from the *Moon*, but its character could not be determined from any of them.

Since the above paper was read Professor LANGLEY has succeeded in obtaining measures, with rock-salt prisms and lenses, in the lunar heat spectrum. This delicate work is by no means yet complete, still, it may be said, in a general way, that the heat curve seems to have two maxima, one corresponding to the solar curve maximum, and the other indefinitely lower down in the spectrum, corresponding to a greater amount of heat at a lower temperature. The inference is that the temperature of the lunar soil is certainly below boiling water, and in an indefinite degree.

Color of the Eclipsed Moon.

As the color of the eclipsed *Moon* has recently been under discussion in some of the astronomical journals, the following observations made at the Allegheny Observatory during the partial lunar eclipse of Sept. 23, of this year, may be of interest.

The principal work done at this observatory consisted of heat measurements made at different phases of the eclipse, and these were successfully carried out. Up to the time of the passing off of the penumbra the sky was beautifully clear. At 2 o'clock A. M., about half an hour before the time of greatest obscuration (0.79), I turned the 13-inch equatorial, armed with a low power eye-piece having a field of over half a degree, upon the *Moon*, and remarked particularly the uniform silvery gray illumination of the eclipsed part. This feature was quite independently noted by Mr. F. W. Very, who was observing with me, and who compared the intensity of the illumination with that of the dark part of the *Moon* in the first quarter. There was no trace of the ruddy or coppery color generally seen under these circumstances. On returning to the telescope half an hour or so later, however, I found the ruddy glow quite perceptible, particularly on the most deeply immersed portion of the *Moon*, when it was so strong that it could not possibly have been overlooked, if it had existed at the time of the previous observation. Toward the edge of the shadow it was less noticeable.

It is well known that the appearance of the darkened body of the *Moon* is greatly different in different eclipses, but perhaps, it is not often that the change has been noticed during the progress of any one eclipse. Such changes as that described may be due to changes in the atmospheric conditions at the points on the *Earth's* surface to which the *Sun's* rays are tangent; or, what is more probable, to similar changes brought about by the rotation of the *Earth* during the time of the eclipse. J. E. KEELER.

Merope Nebula.

On the morning of August 17th last, while waiting for Tuttle's Comet to get above the horizon, the sky being very dark, I examined the *Pleiades*, and could see the faint light in the region about the star *Merope*. The general outlines can be made out by slowly moving the telescope about, when the contrast with the surrounding darker sky becomes very evident.

The failure to see this very interesting object might be attributable to a sky not transparent enough, though seemingly so.

I used a 5-inch Clark refractor, power 45, with which I once before saw the nebula, and have failed to see it on other occasions. J. R. H.

The New Star.

At the meeting of the American Astronomical Society in Brooklyn, on October 5th, the new star in *Andromeda* was the special subject of discussion.

Mr. Henry M. Parkhurst, of Brooklyn, said that he had been observing the star with his 9-inch equatorial every night since its discovery was made known. Mr. Parkhurst has for years been engaged in the special study of variable stars, and he saw at once that the new star was a variable one. He found that it had sunk in brightness about one magnitude in a week after his observations began. When he first saw it, on Sept. 7th, it was of the 8.5 magnitude. Its magnitude has since decreased to 11.7, but its rise and fall have not been uniform. Mr. Parkhurst exhibited a drawing showing the erratic variations in the magnitude of the star. He said that four different observers, Mr. Barnard at Nashville, Mr. Denning in England, John H. Eadie at Bayonne, N. J., and himself had independently observed sudden variations in the brightness of the star resembling the flickering of a fire. In this respect the new star differed from all ordinary variables.

Mr. Eadie and Mr. Parkhurst frequently compared their observations, and one evening they found that a clearly perceptible increase in the star's brightness had occurred in the course of some two hours. Mr. Parkhurst found the star to be a little different in position from the old nucleus of the nebula. This nucleus was visible all the time unchanged, and this fact had led him to change his views as to the location of the star. At first he had thought it was in the nebula, but when he found that the nucleus of the nebula was entirely undisturbed the opposite conclusion was clearly suggested, namely that the star was not connected with the nebula.

Mr. Eadie corroborated Mr. Parkhurst's statement that one evening within the course of some two hours the star had increased between one half and a whole magnitude in brightness. The new star occasionally exhibited a curious shimmering which was very easily seen.

Professor Geo. W. Coakley suggested that the shimmering or flickering of the star's light might be due to floating vapors in our atmosphere, or to variations of atmospheric density.

Mr. Eadie replied that other stars in the same field of view at the same time had not exhibited any such phenomenon, and Mr. Parkhurst agreed in this statement. The fluctuations of light were almost instantaneous, and these observations were not the result of carelessness or inexperience.

Mr. S. V. White, the President, thought the chances were very

largely in favor of the view that the new star had no connection with the nebula, but was a variable which had always existed between us and the nebula, and had heretofore escaped observation because few observers were carefully watching that particular point, and few were perfectly familiar with the exact location and appearance of the stars seen in or against the nebula. He felt confident that future observers would again see this star suddenly brightening, and that it would be found to be simply a variable star lying in the line of sight of the *Andromeda* nebula.

The discussion will be continued at the November meeting.

GARRETT P. SERVISS.

Gratifying news arrives from Rome regarding the progress of astronomy. A new observatory is being built under the direction of Father FERRARI, S. J., formerly assistant, and successor, of Father SECCHI, in the observatory of the Roman College. Not long after the death of Father SECCHI the Italian government spoliated the Roman College, a private institution belonging to the Jesuits, of the observatory, and drove Father FERRARI and assistants, by police force, out of its walls. The college, which, by its world-wide reputation, had deserved the support of the new government, rather than the spoliation of its most valuable department, survived the usurpation, and has now erected a small dome with a four-inch equatorial by MERZ, equipped with helioscope, spectroscope, thread-micrometer, etc., and nearly completed a larger one, which is to be furnished with a 10-inch equatorial by the same maker. Thus it is expected that the valuable work of Father SECCHI in the interest of astronomy will in its whole extent be continued by his brethren at Rome. J. H.

THE GREAT NEBULA IN MONOCEROS.

The SIDEREAL MESSENGER for March, 1884, No. 22, contains an article by Dr. Swift on a great nebula that he had discovered in the constellation *Monoceros*. I have lately examined this object carefully and obtained its position with the 6-inch equatorial. The place is, from four equatorial pointings,

$$\left.\begin{aligned} \alpha &= 6h\ 24m\ 48s \\ \delta &= +5^\circ\ 7'.5 \end{aligned}\right\} 1886.0.$$

On the night of January 29th, 1883, I ran upon this object while seeking comets with 5-inch refractor, and never having heard of it, thought it might be a comet, and watched it a large part of the night for motion. Writing to Prof. Swift about it, he notified me that he had found it

some years previous. My note for that time says: "Found a large nebulous object, close *n. p.*, a scattering cluster of bright stars; it is elongated southwest and northeast. Larger than the field of view."

I have frequently swept up the nebula since without at the moment thinking of it, showing that it must be quite conspicuous.

My notes of this object made on the night of Oct. 30th, 1885, with 6-inch refractor and comet eye-piece of about 1° diameter of field, are:—

"The great nebula in *Monoceros* is quite conspicuous. It close precedes the coarse cluster, and is very large and very much extended. There is no condensation that I can see. It strongly resembles that very diffused part of the great *Andromeda* nebula that extends *p.* G. C. 106. It is simply a great diffused nebulosity, without any apparent condensation, though I suspect a slightly denser part away from the middle, in the direction of the cluster."

I again observed this nebula on November 3rd, when the sky was clearer and the object at a greater altitude:—

"The great nebula in *Monoceros* examined to-night (after midnight). It is quite conspicuous and is extended very much in a direction *s. p.* There is a decided but ill-defined spot of light in the nebula *just* opposite the cluster (some 10′ to the north of the cluster.) I also suspect another nebulous spot in the nebula a little *s. p.* the one just mentioned. There is a large dark spot in the *p.* end of the big nebula. I have not previous for certain seen the two faint condensations and the dark spot."

With a low power and any aperture of consequence, no one will have the least trouble in seeing this quite remarkable object.

It is probable that the condensations I have described are the same seen by Prof. Swift, and described in the article I have referred to.

E. E. BARNARD.

Vanderbilt University Observatory, Nov. 8, 1885.

In answer to the queries of a friend from Exeter, N. H., it may be said, we know certainly nothing about the habitability of the planets. Judging from analogy and from a very imperfect knowledge of the physical conditions of even our nearest neighbor, *Mars*, it is very doubtful if beings like ourselves could live there. Much more improbable is it that a suitable abode for man would be found on any other planet

It is possible, to be sure, that some form of life may exist on any, or all, of the planets. But if different from that of the *Earth* we could scarcely make an intelligent guess concerning it.

MITCHEL'S "Planetary and Steller Worlds," PROCTOR'S "Other Worlds

Than Ours," and many other popular works speak of this and kindred themes, but none are devoted to it exclusively because known facts are too few.

Answers to other queries will be readily inferred.

Chronograph Pens.

Everyone who has worked with a chronograph is familiar with the endless small troubles which come from poor pens and unsuitable ink. I have tried nearly everything, from glass pens of the usual form at $3.60 a dozen, to stylographic and fountain pens at $3.00 apiece. I have never been satisfied till about a year ago, when we began manufacturing glass pens here for our own use. These I consider perfectly satisfactory, the only drawback being that they require filling about every twenty minutes. This has never been an inconvenience in my work, but it may prove so to others. The pens should not have more than 1 inch or 1.5 inches of their length filled. The ink can be renewed with a stylographic pen filler. The ink *must* be William A. Davis' Treasury Green Ink for the best results. This gives a chronograph sheet which is very easy to read. After using, the ink may be left in the pen. One pen lasts us a month to three months.

Such pens will be furnished at $1.10 per dozen by Mr. G. W. Brown, Washburn Observatory, Madison, Wisconsin. They will be sent registered. I believe they will give perfect satisfaction.

EDWARD S. HOLDEN.

The Great Nebula of Andromeda.

In the October number of the Sidereal Messenger I called attention to a small nebula involved in the preceding end of the Great Nebula of *Andromeda*.

Through the kindness of Professor Ormond Stone and Dr. Lewis Swift, (both of these gentlemen having examined it), I am enabled to give some further information concerning the object. At my request Prof. Stone very kindly looked the object up and says of it: "It is very plainly visible in the 26-inch with a low power * * * . It is much elongated and might very properly be described as a condensation in the nebula of *Andromeda*."

Dr. Swift's remarks are about to the same effect, and he further adds that he found several others much fainter and further west of the Great Nebula.

I have for some time suspected another nebula, this one being in the *f.* end of the Great Nebula. Last night being very clear I verified its existence

and can find no record of it anywhere. This object lies 17.1′ north of, and follows by 29ˢ, the star *b* of my diagram in MESSENGER for October. I take that star to be W. B. 0ʰ 952. Hence the place of the nebula is

$$\left.\begin{array}{l}\text{R. A.}=0^h\ 38^m\ 15^s;\\ \text{Decl.}=+41^\circ\ 13.6'\end{array}\right\}\ 1885.5$$

This object is extremely faint, but by averted vision it flashes out quite distinctly. It is just free of the north following end of Great Nebula. To find it: "If a line be passed through the star *b* of my diagram and the *nova* and extended north-easterly to a distance equal to that between *nova* and *b* the nebula will be found several minutes north of the *f.* end of the line. It is close *s. f.*, a small star.

E. E. BARNARD.

VANDERBILT UNIVERSITY OBSERVATORY, Nashville, Tenn., Oct. 9, 1885.

Professor PORTER permits me to communicate the following observations of the new star in the *Andromeda* nebula:

The star has been observed at Mt. Lookout on the nights of Sept. 2, 3, 11 and 21 with the 11-inch equatorial, and on several nights with the 4-inch. It seems to be growing fainter. The following are independent estimates of magnitude:

	Porter.	*Wilson.*	*Mean.*	
Sept. 2	8.0 or brighter.	8.0	8.0	
Sept. 3	Same.	Same.	8.0	
Sept. 11.....	9.0	9.0	9.0	
Sept. 21.....	9.0 or fainter.	9.5	9.3	(Bright moonlight.)

On the 2nd and 3rd the star was supposed to be coincident with the nucleus of the nebula, but on the 11th and 21st the nucleus was seen independent of the star. According to the notes of both observers, the star precedes and is a little north of the nucleus. It is certainly not 5″ south of the nucleus, as stated in the Dun Echt circular, No. 98.

H. C. WILSON,
Assistant.

Mt. Lookout, O., Sept. 22, 1885.

BOOK NOTICE.

H. N: Siebenstellige Logarithmen der trigonometrischen functionem fur jede Zeitsekunde. Leipzig. B. G. TEUBNER. 1885. (Price $1.50.)

Each minute of time occupies a page of 60 lines; the type is large and clear and old style. Proportional parts are given for every tabular difference in one third of the table, but in the remaining two-thirds, the logarithmic tangents vary so rapidly that the proportional parts for for some differences have to be omitted. After the printing was completed, a comparison of the table with the seven-place tables of TAYLOR and SHORTREDE resulted in the discovery of thirteen errors, which are noted in the preface.

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NOTE.—The numbers following the titles of articles are the pages of Volume IV. Those in parenthesis are the numbers of the minor planets.

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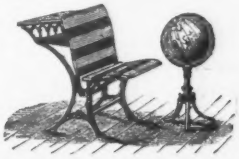

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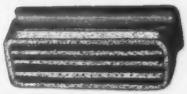

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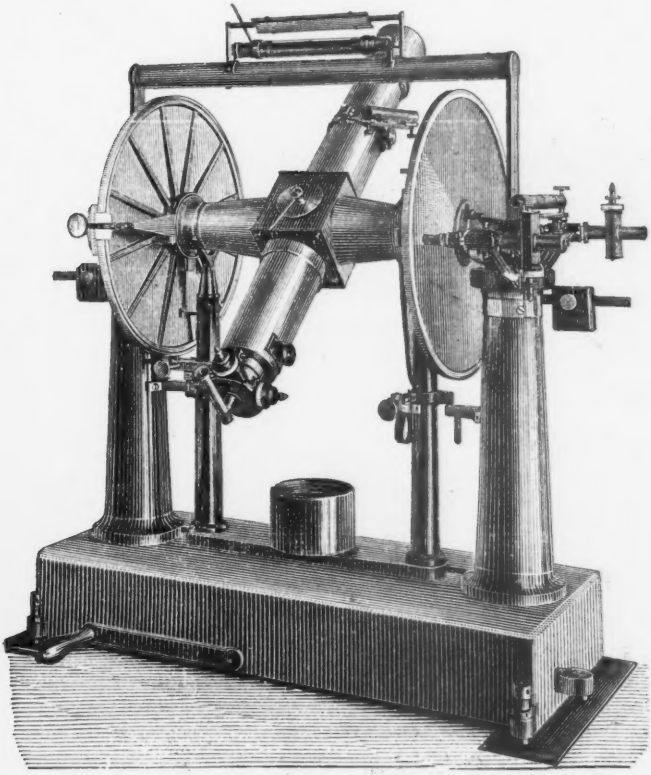

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